

# Tree and shrub species preferences and planting materials used by sub-religious communities in the village groves of floodplain area of Bangladesh

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**Abstract:** An exploratory study of the traditional homestead forest of two different religious groups (Hindu and Muslim) in one selected floodplain area of Bangladesh was conducted over a period of six months from January to June 2002. The species' (both tree and shrub) preferences, similarities, use and sources of planting materials, spacing and location of species in the homesteads of both Hindu and Muslim communities were studied. It was found that *Mangifera indica* as tree species and *Ocimum sanctum* as shrub species were the best preferred species of the Hindu community. *Artocarpus heterophyllus* as tree species and *Lawsonia inermis* as shrub species were found best preferred by the Muslim community. Floristic similarities between the two groups were found 86.57% in tree species and 78.48% in shrub species. Both seed and seedlings of tree and shrub species as planting materials were used by the highest percentage of both the religious communities. For tree species, homegarden was reported to be the highest source (39%) and for shrub species, nature was the highest source (40%), which was found in the Hindu community.

**Key words:** Species preferences; Species similarity; Planting materials; Hindu; Muslim; Homestead forests; Floodplain area; Bangladesh.

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## Introduction

The village forest is not only a part of our culture but it also contributes a large extent to our economy. It is an age-old forestry practice in which a number of crops including trees are grown with livestock, poultry and fish, mainly for the purpose of satisfying the farmers basic needs (Akhtar 1997). Homestead tree production system in villages is a mode of species and genetic conservation for a good number of trees in Bangladesh (Alam *et al.* 1996). Although architectural arrangement and mode of tending operations are not planned in the village forests, human preference or choice and natural adaptation establish an ecological stability and sustained yield in the production system (Alam and Mohiuddin 1992).

In Bangladesh, village forestry enjoys a rich legacy and tradition. Alam *et al.* (1990); Akhtar *et al.* (1989); Momin *et al.* (1990); Kar *et al.* (1990) and Dasupta *et al.* (1990) reviewed and summarized the status of village forestry as practiced in Bangladesh for the first time. Among the six major categories of forestland resources of Bangladesh, 2.14 million  $\text{hm}^2$  are state-owned forests, managed by the forest department of the government. The hill-reserved forests cover about 69% of the total forestry land area,

while the village forests cover about 13% (Kibria *et al.* 2000; Siddiqui and Khan 1999). Although the area of this village forest is less than one sixth of the state owned forests of the country, they cater for 70% of the timber, 90% of the fuelwood and 90% of the bamboo consumption of the country as a whole (Quddus *et al.* 1992). The total standing volume of trees on homestead lands is estimated to be about 80 million  $\text{m}^3$ , which is over seven times the volume of the forest stock in the Sunderbans forests of Bangladesh. About 10 million households in over 85000 villages have usable land around their homes, and about 80% of such lands are covered with trees (Hossain and Chatterjee 1999).

In Bangladeshi societal context, village forestry facilitates various social, cultural and religious activities of villagers. Despite the widespread poverty and destitution in rural Bangladesh, she has rich traditional culture, and a variety of practical and spiritual uses (Hossain and Chatterjee 1999). In Indian sub-continent, traditional tales, mythological stories and events in the epics, and also innumerable religious practices of worship in the households, in the religious institutions, in festivals, birth and death, are all replete with references to plants (Chaudhury and Pal 1990).

Flood plain areas in Bangladesh occupies 80% of the total area of Bangladesh (Alam *et al.* 1991). Naseem and Alam (1998) argued that people of rural Bangladesh particularly in the floodplains, generally have developed different farming systems and techniques through a process of adaptation that have been fine-tuned with the local en-

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vironment, economy and socio-cultural systems. Narsingdi district is a floodplain area through which three prominent rivers of Bangladesh, the Meghna, the Brahmaputra and the Sitalakhya are flowing (BBS 2001). All of these rivers cause seasonal flooding in most of the riverbanks almost every year (BBS 2001). In this floodplain area, there is no government owned reserved or protected forests. Therefore, village forest has a great importance for maintaining ecological balance in that area (Mia and Huq 1988).

Social attitudes towards homestead forestry in Narsingdi district was studied by Uddin *et al.* (1998). Indigenous knowledge on the production systems of homestead forestry in Narsingdi region was studied by Miah and Hossain (2001). Miah and Hossain (2002) explored the tree resources in the floodplain areas especially in Narsingdi region of Bangladesh. But no report on the religious or cultural implication on the stock and management of homestead forests in Narsingdi region was found. The status of the culture especially religious effects on the stock and management of the homestead forests is a prime research question to identify the important cultural factors both for conserving and degrading the homestead forests. Such study results will be of immense importance to formulate national policy for the conservation and development of the homestead forests in Bangladesh. As Miah and Hossain (2002) explored a large pool of tree species diversity in Narsingdi region as a floodplain area of Bangladesh, it was hypothesized that Narsingdi region encountered a specific type of cultural especially religious factors, which had a positive implication with conservation and development of the homestead forests. Thus the study was undertaken to explore the religious factors on homestead forests particularly of Muslim and Hindu community in Narsingdi region, Bangladesh.

## Materials and methods

### Sampling Framework

A multistage simple random sampling technique was adopted to locate representative households for the study. Sampling was done at four levels of Narsingdi District; district, Upazila(sub-district), village and households (respondent). The survey was carried out over a period of five months from January to June, 2002.

### Reconnaissance survey

Before the study, a reconnaissance survey was made in three Upazilas. The objectives of this survey were to select the study areas, identify respondents and rapport building with the local leaders and the people of the study areas.

### Selection of the study area and respondents

Administratively Bangladesh consists of 64 districts, 490 Upazilas, 4451 unions and 68000 villages (BBS 1997). A large number of Muslim people (92.13%) as well as Hindu people (13.45%) are living in Narsingdi district (BBS 1995).

As three prominent rivers of Bangladesh, the Meghna, the Sitalakhya and the Brahmaputra flow over Narsingdi district, it was selected purposively. The district comprises six Upazilas, of which three Upazilas namely Narsingdi sadar, Raipura and Palash were selected as secondary sampling unit and every two villages from each Upazila were selected as tertiary sampling unit. From a total of six villages, data were collected both from the Muslim and the Hindu communities. For each community a total of 36 households were surveyed taking every six from each village. In such a way, another 36 households were sampled for the Muslim community. Thus a total of 72 households were sampled for the whole study. The sampled respondents consisted of the male or female household heads along with other household members. Woman members and the comparatively old-aged members in particular were interviewed because of their involvement was important in practicing the traditional homestead forestry activities and having the knowledge about the folk and myths.

### Vegetation survey procedure

A systematic vegetation survey was conducted at each selected homestead compounds and campus of the religious institutions to ascertain the tree and shrub species composition and their structures. The head of the family and the local old aged persons were requested to show and tell the local names in-situ and other particulars of the species present in the homesteads and in the sacred places.

In the homesteads and at the campus of the religious institutions, a full direct enumeration process was adopted. After the vegetation survey, a list of the tree and shrub species present in the homesteads and sacred places was made with the basic reference of Prain (1981).

To ascertain the floristic composition, the plants were first categorized into trees and shrubs. Due to the common presence of the bamboo species in the homesteads, bamboo was included in the vegetation survey as a different vegetation component. Species composition was also shown in terms of natural and plantation; indigenous and exotic growing stock with age-class distribution. The age of the tree and shrub was ascertained through the cross discussion of the family members and the neighboring old-aged people. The mode of natural and plantation growing stock was identified in the same way. The age class distribution of the growing stock in the sacred places was excluded from the study because of the difficulties of age identification. Species richness was calculated as the number of the total species present. To find out the green coverage in the selected sites, areas of the crown of both trees and shrub was measured. The closed crowns of both tree and shrub were measured as intermingled vegetation cover. Other crowns were measured as individual/scattered green coverage.

### Similarity of species

To find out the similarity of species in the homesteads of

different religious groups, Similarity index (SI) values were calculated using the formula:

$$SI = (2c / a+b) * 100 \text{ (Muller-Dombis and Ellenberg 1974)}$$

Where

$a$  = Number of species present in community A

$b$  = Number of species present in community B

$c$  = Number of species Common to both communities.

The value derived is called the "Squensen's index of similarity" according to Muller-Dombis and Ellenberg (1974) and it expressed the actually measure coinciding species occurrence against the theoretically possible one. To find out the similarity index of species between two religious groups, each religion was considered a single unit and the species that were recorded from both the religions were regarded as the common species to assess the index between the religions.

It is to be noted that in calculating the species similarity, each religion was considered as a single unit and thus the species recorded from all categories of a religion was considered as the total number species for that religion.

### Species preference

Paired ranking exercise was carried out to select top ten

species and grading was done accordingly in each religious groups.

## Results and discussion

### Species preferences

It was found that *Mangifera indica* as tree species and *Ocimum sanctum* as shrub species were the best preferred species of the Hindu community. *Artocarpus heterophyllus* as tree species and *Lawsonia inermis* as shrub species were found best preferred by the Muslim community (Table 1). The use of the species in the table indicates that both tree and shrub species has cultural use by the Hindu community than that of Muslim. It is obvious that both communities prefer tree and shrub species with multipurpose uses. In the column of tree species in the table, it is clear that next to the cultural use of the tree species by the Hindu community, medicinal use is the second priority of preference, whereas the Muslim community has a main criterion as timber yielding capacity of the tree species. Most of the shrub species preferred by the Muslim community implicates with aesthetic purpose only. Only two shrub species have been found which have some cultural use of the Muslim community.

**Table 1. The top ten species preferred by the Hindu and Muslim community in Narsingdi floodplain area of Bangladesh**

Religious Community	Species Ranking	Tree species		Shrub species	
		Local name	Scientific name	Local name	Scientific name
Hindu	1	Am (C, F)*	<i>Mangifera indica</i>	Tulshi (C, M)	<i>Ocimum sanctum</i>
	2	Bel (C, F, M)	<i>Aegle marmelos</i>	Pepe (F, V)	<i>Carica papaya</i>
	3	Narikel (C, F, M)	<i>Cocos nucifera</i>	Zhumku Zaba (C, A)	<i>Hibiscus schizopetalus</i>
	4	Sazina (M, V)	<i>Moringa oleifera</i>	Tagarful (C, A)	<i>Tabernaemontana coronaria</i>
	5	Kanthal (F, T)	<i>Artocarpus heterophyllus</i>	Kamini (C, A)	<i>Murraya paniculata</i>
	6	Jambora (F, M)	<i>Citrus grandis</i>	Lankajaba (C, A)	<i>Malvaviscus sylvestris</i>
	7	Neem (M, T)	<i>Azadirachta indica</i>	Gondharaj (A)	<i>Gardenia jasminoides</i>
	8	Supari (F)	<i>Areca catechu</i>	Asamlata (M)	<i>Eupatorium odoratum</i>
	9	Dumur (M, Fo)	<i>Ficus hispida</i>	Mendi (M)	<i>Lawsonia inermis</i>
	10	Raintree (T)	<i>Samanea saman</i>	Arhar (H)	<i>Cajanus cajan</i>
Muslim	1	Kanthal (F, T)	<i>Artocarpus heterophyllus</i>	Mendi (C, M)	<i>Lawsonia inermis</i>
	2	Am (F, T)	<i>Mangifera indica</i>	Pepe (V, F)	<i>Carica papaya</i>
	3	Boroi (F, C)	<i>Ziziphus jujuba</i>	Dalim (F, M)	<i>Punica granatum</i>
	4	Supari (F)	<i>Areca catechu</i>	Motkila (C)	<i>Glycosmis pentaphylla</i>
	5	Narikel (F, M)	<i>Cocos nucifera</i>	Sheto Akanda (H, M)	<i>Calotropis procera</i>
	6	Sazina (V)	<i>Moringa oleifera</i>	Kanta Mehendi (H, M)	<i>Duranta repens</i>
	7	Mehegoni (T)	<i>Swietenia mahagoni</i>	Hasnahena (A)	<i>Cestrum nocturnum</i>
	8	Akashmoni (T, Fu)	<i>Acacia auriculiformis</i>	Rakta Jaba (A)	<i>Hibiscus rosa-sinensis</i>
	9	Koroi (T)	<i>Albizia spp.</i>	Golap (A)	<i>Rosa indica</i>
	10	Sissoo (T)	<i>Dalbergia sissoo</i>	Arhar (H)	<i>Cajanus cajan</i>

\* Letter in the parentheses indicates the main uses of the species; where they denotes as A= Aesthetic, C=Cultural, Fo=Fooder, Fu=Fuelwood, H= Hedge, M= Medicine, T=Timber and V=Vegetable.

Generally, it is clear to document that both the communities prefer tree and shrub species which has multipurpose

use. Uddin *et al.* (1998) also espouse this results for the whole Narsingdi district of Bangladesh. *Mangifera indica* is

found obvious in two most important events in life of the Hindu community, i.e., (i) In the marriage ceremony, the leaf of this species is essential for making the *Ghot* both for the bride and bridegroom and (ii) While burning Hindu's body in funeral time, the wood of this species is necessary because of its certain religious importance. In making *Ghot* for offering *Puja* and some other social and religious festivals, it is used as a sign of sacred thing. Because of these, *Mangifera indica* was found best preferred tree species by the Hindu community. At every established house of Hindu community, *Ocimum sanctum* is found in the yard. It is planted as sacred plant where *Puja* is offered at every morning. That is why it was the best preferred shrub species by the Hindu community. It was reported that both bole and fruit of *Cocos nucifera* had cultural values of Hindu community. These parts are considered as sacred. No part of this species is even burnt for any purpose. Barua (1995) also agrees with this finding for Bangladesh and Indian Hindu community.

Muslim community had the best preference for shrub species as *Lawsonia inermis*. The pest of the grinded leaves of this species is found to be used as sacred colour

in hands of both female and male in different holy festivals and it is mandatory to use it by the bride and the bridegroom during their marriage ceremony. The male persons are found to use it in their hair and breads. In the Muslim community, the use of the dye of this species is regarded as *Sunnat* (should be done). *Glycosmis pentaphylla* has the special use by the Muslim community for tooth brushing by its tender stems. It has no any religious implication, but social folkways.

The floristic similarity of tree species between two religious groups was found to be 86.57% while similarity of shrub species between the two religious groups was found to be 78.48%. The higher floristic similarity was due to similarity in geography, location, social attitudes, home gardening pattern and uses and whatever is the dissimilarity is due to differences in religious beliefs.

### Planting materials used and their sources

Both seed and seedlings of tree and shrub species were used by the highest percentage of both the religious groups, whereas stumps were used by the least percentage (Table 2).

**Table 2. Percentage of planting materials used by the Hindu and Muslim community in Narsingdi floodplain area of Bangladesh**

Planting materials	Tree species used by the households (%)		Shrub species used by the households (%)	
	Hindu	Muslim	Hindu	Muslim
Seed	9	6	8	4
Seedling	22	24	26	32
Both seed and seedlings	29	31	36	37
Vegetative	7	5	9	3
Seed, seedling and vegetative propagules	28	30	18	22
Stumps	5	4	3	2
Total (%)	100	100	100	100

For regenerating the homesteads plants, different types of planting materials were found to be used which were more or less common for Hindu and Muslim families. For both the religious groups seven reasons were identified: easy availability, better quality, more survival rate, convenient size, safe from grazing animal, cheap and having the knowledge for regenerating the species. Millat-e-Mustafa (1996) and Uddin *et al.* (1990) reported the similar reasons in choosing the planting materials in Bangladesh village groves.

Homegarden was reported to be the highest source (39%) for the collection of tree species planting materials, which was found in the Hindu community followed by 31% for the Muslim (Table 3). While collecting the planting materials of shrub species, nature (40%) was found as the highest source for the Hindus in contrast with the market (38%) for the Muslims. In this study, nature has been depicted as the place where naturally regenerated seedlings grow, which is in the marginal/waste place used commonly by the community member. Very clearly, this place is regarded as the common property resource in the village. In the study, these places were recorded as the embankment, roadsides and

some other *Khas* (government) lands. Market is depicted as the place where private nurseries send seedlings/seeds for sale in the weekly *Hats* (market day). Governmental nurseries usually do not send their seedlings to the market place. The consumers directly buy mainly seedlings from these nurseries. It is to be noted that except market/Government nurseries, the households are not to pay for the planting materials.

The reasons for considering 'homegarden' as the highest source of trees for both the religious groups were careful collection of seeds and artificial regeneration and sincere maintenance. The availability of women labors in the households also was an another cause for producing planting materials in the same homesteads. The shrub species selected by the Muslims were mainly for the beatification of the homesteads. As these species are available in the market/government nursery, the Muslim collect this from that place. On the contrary, the Hindu community choose the shrub species mainly for their religious purpose with some medicinal uses; which are mainly indigenous species. But in the market/government nurseries, exotic species are mainly regenerated. So, nature was the highest

source for the Hindu community for the collection of planting materials of shrub.

**Table 3. Percentage of different sources of planting materials used by the Hindu and Muslim community in Narsingdi floodplain area, Bangladesh**

Sources	Tree species used by the households (%)		Shrub species used by the households (%)	
	Hindu	Muslim	Hindu	Muslim
Homegardens	39	31	28	20
Neighbors/ Relatives	21	28	24	23
Market/Government nurseries	8	13	8	38
Nature	32	28	40	19
Total	100	100	100	100

### Location and spacing of planting

The householders were reported to select the location to be planted based on the characteristics of the plant and its importance. In both Hindu and Muslim families, the survey showed three specific locations: homestead boundary (adjacent to the dwelling house), homestead boundary away from the dwelling houses/pond bank and inside the homestead. Trees in the homestead-boundary acted as a live fence and windbreak. Trees which cast more shade, requires less care, safe of theft were usually placed away from the living quarter; species which require intense care and supervision (eg. fruit trees needs to be safe from theft) were usually planted nearby the living quarter.

In both religious groups the homestead trees and shrubs had no definite spacing pattern as be detected. Though all the householders were well aware about the positive effect of wider spacing, but they opined that to meet their multiple demand from the small unit of land they could not maintain the wider spacing. Families of all religions reported that plants were spaced in wider gap in the early stages of homestead development. But gradually it could not be possible to maintain since seeds after eating often scattered here and there without due consideration of spacing and they also managed the in-situ wildling without transplanting those to avoid risk of mortality.

### Conclusions

Species preference, sources of planting materials and similarity of the species clearly indicate a distinction of sub-cultural effects on tree and shrub species in Narsingdi floodplain area of Bangladesh. The species preference shows that whatever the species has cultural/religious use, it is preferred firstly for planting or nurturing. Than the other economic uses in the preference criteria come out. Various cultural implications with many tree and shrub species of Hindu community indicate a positive impact on the conservation of the village groves. Nature as the highest source of planting materials of shrub species by the Hindu community also implies native species conservation efforts. This study clearly depicts a cultural positive impact of Hindu community on the village groves than that of Muslim, though there are some common phenomena between the

two religious groups. The findings of this study have some policy implications for the forest conservationists and biodiversity consultants. This traditional knowledge may be used as tool for the village grove conservation. To understand clearly the framework of sub-religious effects on the village grove, more socio-religious research should be carried out on more different components of the biodiversity of the village groves.

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